



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/816,177	03/26/2001	Masaaki Hatano	04329.2553	7586
22852	7590	11/19/2003	EXAMINER	
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP 1300 I STREET, NW WASHINGTON, DC 20005			MITCHELL, JAMES M	
			ART UNIT	PAPER NUMBER
			2827	

DATE MAILED: 11/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	09/816,177	MASAAKI HATANO	
	Examiner	Art Unit	
	James M. Mitchell	2827	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 September 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,13 and 15-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,13 and 15-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |                                                                                                         |                                                                             |
|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                    | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 1,2, 13, 15 and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (US 6,350,667) in combination with Ding et al. (US 6,057,237) and Cabral JR. et al. (US 2002/0046874).

Chen (Fig 1b; Col. 6, Lines 47-59) discloses a semiconductor device comprising: a Cu film (3) provided above a main surface of a semiconductor substrate (1) and used as a wiring; an intermediate layer (7) formed at least on the Cu film, the intermediate layer comprising a TaN film formed on the Cu film and a Ta film formed on the TaN film, and an Al film (5) used as a pad formed on the Ta film; wherein the intermediate layer has a first portion which contacts the Cu film and a second portion which does not contact the Cu film, and an insulating film (4) contacts the second portion surrounding vertically extending portions; wherein the Al film inherently has a plurality of vertically extending portions (via material formed of multiple contiguous layers) extending toward the Cu film, and wherein the intermediate layer has an inherent plurality of portions (via material formed of multiple contiguous layers) provided between the vertically extending portions and the Cu film.

3. Chen does not appear to disclose the thickness of TaN film as 20 nm or more, an Al film formed on a Ta film or that the Ta has a thickness of 5nm.

4. Ding (Abstract; Fig 3 ) utilizes a multilayer intermediate layer ("barrier layer") comprising 100nm Ta film formed on TaN with a thickness of 5nm.

5. Likewise, Cabral (Abstract; Fig 3) discloses the use of Ta formed on TaN.

It would have been obvious to one of ordinary skill in the art to incorporate Ta with the TaN intermediate layer of Chen as shown in Cabral, in order to provide an improved barrier layer preventing peeling as taught by Ding (Abstract; Col. 2, Lines 5-7).

6. With respect to claims 13 and 15, the thickness of Ta being 5nm or less and TaN being 20nm or more, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

7. Claims 16-22 and 25-27 are rejected under 35 U.S.C. 103(a) as being obvious over Chen in combination with Ding and Galloway (US 5,783,868).

8. Chen and Ding disclose the elements stated in paragraphs 2-5 of this office action and further disclose the Al film having a horizontally extending portion under which the Cu film is not formed.

9. Neither Chen nor Ding disclose a wire, conductive member connected to the Al film at the horizontally extending portions or that no conductive connection member is connected to that portion of the Al film under which the Cu film is formed.

10. Galloway (Fig 1) utilizes a wire, conductive connection member (12) connected at an extending portion of the pad under which a copper film is not formed.

11. It would have been obvious to one of ordinary skill in the art to further incorporate an extending portion to the pad and to attach a conductive member to said extending portion in order to provide testing and to eliminate device damage as taught by Galloway (Abstract).

12. With respect to claim 20, 21, 22, see paragraph 6 of this office action.

### ***Response to Arguments***

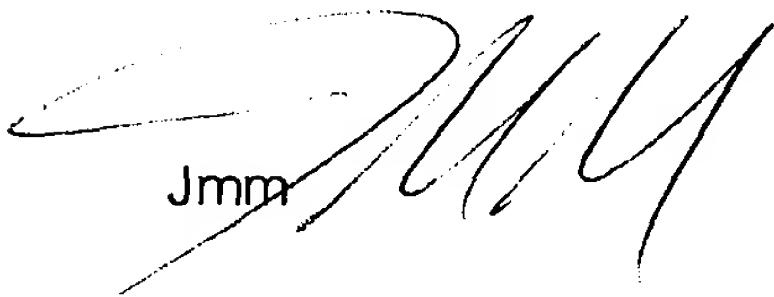
13. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

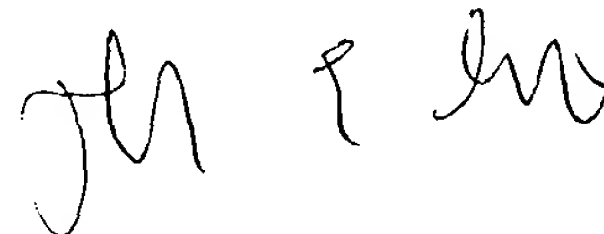
### ***Conclusion***

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (703) 305-0244. The examiner can normally be reached on M-F 10:30-8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (703) 308-1233. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Jmm  




DAVID E. GRAYBILL  
PRIMARY EXAMINER